

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Wang
Appl. No.	:	10/624,728
Filed	:	July 21, 2003
For	:	DUAL CHAMBER VACUUM PROCESSING SYSTEM
Examiner	:	Rudy Zervigon
Group Art Unit	:	1763
Confirmation No.	:	7176

ON APPEAL TO THE BOARD OF PATENT APPEALS AND INTERFERENCES**APPELLANT'S REPLY BRIEF**

Mail Stop Appeal Brief -- Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This Reply Brief relates to an appeal to the Board of Patent Appeals and Interferences of the final rejection set forth in a Final Office Action mailed November 3, 2006 in the above-captioned application. In an Examiner's Answer dated November 29, 2007, the Examiner withdrew all but one of the grounds of rejection in the Final Office Action. Pursuant to 37 C.F.R. § 41.41 and M.P.E.P. § 1208, Appellant provides in the following Reply Brief a detailed explanation of why the sole remaining ground of rejection is improper.

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I. STATUS OF CLAIMS

The present application was originally filed with Claims 1-17. Claims 14-17 were cancelled in an amendment filed in response to a restriction requirement. In the same amendment, Claims 2 and 13 were cancelled and Claims 18-25 were added. In a subsequent response dated August 11, 2006 before the Final Office Action, Applicant cancelled Claims 1 and 3-11. In a Notification dated August 14, 2007, the Examiner agreed to enter the cancellation of Claims 1 and 3-11. Accordingly, only Claims 12 and 18-25 remain pending in this application. A listing of the claims is attached hereto in the Claims Appendix.

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II. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

In view of the Withdrawn Rejections in the Examiner's Answer, the sole ground of rejection remaining for review on appeal is the rejection of Claims 12 and 18-25 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 6,228,773 to Cox ("Cox '773") in view of U.S. Patent No. 6,802,933 to Khan et al. ("Khan").

III. ARGUMENT

The rejection of Claims 12 and 18-25 as obvious in view of Cox '773 and Khan is improper because the Examiner has not presented a prima facie case of obviousness. Neither of the cited references discloses a computer configured to control apparatus elements such that (1) one chamber undergoes the steps of pumpdown and subsequent process pumping while another chamber simultaneously undergoes the steps of venting, workpiece removal, and workpiece reloading; and (2) the pumpdown pumping in one chamber begins at substantially the same time as the venting in another chamber, as recited in Claim 12, the sole pending independent claim. Further, the rejection is improper because the Examiner has improperly applied the legal standard for obviousness and taken an interpretation of "routine experimentation" that defies both law and reason.

A. Legal Standard for Obviousness Under § 103

In its ruling in *KSR International Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 82 U.S.P.Q.2d 1385 (2007), the Supreme Court reviewed the law of obviousness under § 103. While the *KSR* opinion rejected an overly rigid application of the Federal Circuit's teaching, suggestion, motivation test of obviousness, *KSR* does not condone obviousness rejections that cherry-pick various elements from various references without providing any reason why a skilled artisan would combine those references. Rather, *KSR* clearly states that a proper obviousness rejection under § 103 should explicitly state an apparent reason to combine the elements based on the prior art, and cites with approval an ex parte case dealing with the Patent Office's obligations:

Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge for this by a person having ordinary skill in the art, all in order to determine *whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicit. See In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) ("[R]ejections based on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reason with some rational underpinning to support the legal conclusion of obviousness.").

Id. at 1740-41, 82 U.S.P.Q.2d at 1396 (emphasis added).

Further, under the *KSR* standard, *teachings away* in the prior art remain an important part of the analysis under § 103 and cannot be ignored. *KSR* noted the long pedigree in the Supreme

Court's jurisprudence of the principle that teachings away counsel against a finding of obviousness. *See id.* at 1740, 82 U.S.P.Q.2d at 1395 (pointing out that teachings away were dispositive in the Supreme Court's conclusion that claims were nonobvious in *U.S. v. Adams*, 383 U.S. 39 (1966)). Accordingly, when conducting its own obviousness analysis of the patent at issue, the *KSR* court considered the patentee's arguments that the cited references included teachings away. *See id.* at 1743-44, 82 U.S.P.Q.2d at 1398 (ultimately finding obviousness because the teachings away arguments had not been sufficiently supported).

KSR in no way relieves the Patent Office of its obligation to "consider *all claim limitations* when determining patentability of an invention over the prior art." *In re Lowry*, 32 F.3d 1579, 1582 (Fed. Cir. 1994) (emphasis added). Accordingly, it remains well settled law that a finding of "obviousness requires a suggestion of *all limitations* in a claim." *CFMT, Inc. v. Yieldup Intern. Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003) (emphasis added) (cited in *Ex Parte Wada*, 2008 WL 142652, *4 (Bd.Pat.App. & Interf., Jan. 14, 2008)).

In the aftermath of *KSR*, the Board of Patent Appeals and Interferences has repeatedly reversed findings of obviousness when the Examiner has failed to proffer a prima facie case of obviousness, including an apparent reason to combine references. *See, e.g., Wada*, 2008 WL 142652 at *5 ("Because the Examiner has not explained why *every limitation* in claim 1 would have been obvious to a person of ordinary skill in the art, we agree with Appellants that the Examiner has not made out a case of prima facie obviousness.") (emphasis added); *Ex Parte Challapali*, 2008 WL 111346, *4-6 (Bd.Pat.App. & Interf., Jan. 10, 2008) (reversing finding of obviousness because the Examiner failed to establish sufficient reasoning for combining the references).

B. The Examiner Has Not Presented a Prima Facie Case of Obviousness

Claims 12 recites a "computer configured to control the pump and the robot to effect pump-down and subsequent process pumping of one of the chambers during simultaneous venting, workpiece removal and workpiece reloading of the other of the chambers, such that said pump-down pumping of one of the chambers and said venting of the other of the chambers begin at substantially the same time." Each of the remaining pending claims depends from Claim 12 and therefore incorporates this limitation as well.

Thus, in order to establish a prima facie case of obviousness for the pending claims, the Examiner must present, inter alia, some suggestion that a computer be configured to control apparatus elements such that (1) one chamber undergoes the steps of pumpdown and subsequent process pumping while another chamber simultaneously undergoes the steps of venting, workpiece removal, and workpiece reloading; and (2) the pumpdown pumping in one chamber begins at substantially the same time as the venting in another chamber. However, neither of the cited references suggests such a configuration. To the contrary, Khan does not even hint at such a system and Cox '773 expressly teaches away from the arrangement recited in the pending claims.

As noted in the Appeal Brief, the Examiner is in agreement that Cox '773 fails to teach the "computer configured to" limitation of Claim 12. See Final Office Action at p. 9. In an attempt to find a suggestion of this limitation in Khan, the Examiner's Answer quotes certain excerpts from Khan that generally discuss the use of pumps to regulate pressure and disclose that control systems can be used to coordinate the action of the pumps with other system parameters. See Examiner's Answer at pp. 9-10. These excerpts in no way suggest the specific configuration recited in the "computer configured to" limitation of Claim 12.

A generous reading of the quoted portions of Khan suggests that the control of certain elements, such as throttle valves, can be varied to achieve different goals, such as different target pressures. However, Khan does not disclose an operational sequence as recited in the "computer configured to" limitation of Claim 12. Moreover, a generalized statement that some things can be changed is a far cry from a suggestion that a computer be configured to control operation to carry out certain steps in a certain sequence, as recited in the pending claims. The Board's recent decision in *Ex Parte Beresford*, 2008 WL 111202 (Bd.Pat.App. & Interf., Jan. 9, 2008), amply demonstrates this point. In that case, the Examiner asserted that a prior art publication by Beresford teaching certain exercises to alleviate visual problems, along with a statement that the reader 'can even create your own Booster Sequences to emphasize the most effective techniques,' rendered obvious a claim reciting a particular sequence of exercises. *Id.* at *4. On appeal, the Board disagreed:

The passage cited by the Examiner teaches no more than to combine/alternate the sequences disclosed in Beresford to deal with multiple visual problems. Beresford . . . *does not provide any guidance on how the published sequences might be varied.* This is not the same as altering the sequences in the book to

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create the general, timed, or ordered sequences of the claims on appeal (which Beresford does not disclose). The Examiner has failed to provide adequate articulation of his reasoning to support the legal conclusion of obviousness.

Id. (citing *KSR International Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007)). Because the Examiner has failed to point to any reference suggesting the “computer configured to” limitation of Claim 12, the Examiner has failed to set forth a prima facie case of obviousness. For at least this reason, Appellants respectfully request that the Board reverse the obviousness rejection.

C. The Examiner Has Improperly Applied the Legal Standard for Obviousness

The Board should reverse the obviousness rejection for the additional reason that the Examiner has attempted to support his rejection with a rationale that contradicts the legal standard for obviousness. In the Final Office Action, the Examiner took the position that “Motivation to add Khan’s computer controller method for automating Cox’s above process components . . . is for process automation as taught by Khan. . . .” Final Office Action at p. 10. Appellant pointed out in its Appeal Brief that the cited references would lead a skilled artisan with a goal of process optimization *away* from the operational sequence recited in Claim 12 and toward the sequence taught in Cox ‘773. Cox ‘773 seeks to achieve a “zero overhead” process, which means that workpiece processing is always occurring in one of the chambers. In contrast, the claimed invention sacrifices temporal efficiency to gain the combined advantages of (1) a reduction in the number of pumps, and (2) process pumping during the entirety of each chamber’s processing phase. *See* Specification, ¶ [0022] - [0024]; Figs. 3 and 4.

In response to these points, the Examiner’s Answer asserts that the cited combination “would form a template for routine experimentation that would yield Applicant’s claimed sequences.” *See* Examiner’s Answer at pp. 10-11. This assertion is erroneous because it ignores the teachings away from the claimed configuration in Cox ‘773. “Routine experimentation” with the systems taught in the cited references, in and of itself, would not lead a skilled artisan to adopt a system that intentionally contradicts Cox ‘773’s stated goal of zero overhead. In this regard, the Examiner appears to be confused about the role of teachings away. The Examiner’s Answer cites *in support of* the Examiner’s position case law that highlights the importance of teachings away. Examiner’s Answer at p. 11 (“A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540 (Fed. Cir. 1983), cert. denied, 469 U.S.

851 (1984).”). The Examiner fails to appreciate that this is the very case law that explains why the Examiner’s rejection is improper. See *W.L. Gore*, 721 F.2d at 1550-53 (finding that the district court erred as a matter of law in finding obviousness, in part because the court disregarded disclosures in the cited references that taught away from the invention).

The Examiner also mischaracterizes the differences between Cox ‘773 and the inventive system and conflates Appellant’s Exhibit A with the actual teachings of Cox ‘773. The Examiner’s Answer states:

The only difference between Cox’s Figure 15 and the claimed controller, with respect to chamber 1 as shown by the time line, is a downtime in chamber 1 of applicant’s invention between loading and pump down steps. Chamber 1 of Cox shows no down time in his chamber 1 operations. The only difference between Cox’s Figure 15 and the claimed controller, with respect to chamber 2 as shown by the time line, is that Cox’s chamber 2 has a downtime between processing and venting while Applicant’s chamber 2 operations are continuous.

Examiner’s Answer at 10. These statements are incorrect in that they fail to appreciate all of the differences between Cox ‘773 and the inventive system. For example, the Examiner fails to appreciate that the Figure 15 embodiment of Cox ‘773 does not conduct process pumping during the entirety of each chamber’s processing phase.

Moreover, these statements by the Examiner give Cox ‘773 too much credit. While Exhibit A accurately illustrates the actual operation of the sequences taught in Cox ‘773, Cox ‘773 itself did not recognize all of the characteristics of the operational sequences that are shown in Exhibit A. For example, while Exhibit A shows down time in Chamber 2 between processing and venting in the Figure 15 embodiment of Cox ‘773, there is no recognition in Cox ‘773 that this down time would occur. Rather, it was the inventor of the current application that recognized this characteristic of the actual performance of the system taught in Cox ‘773. The Examiner should not attribute the entire disclosure of Exhibit A to Cox ‘773.

In addition, the Examiner’s statements excerpted above take an unreasonably myopic view of the inventive system. The Examiner compares the operation of each individual chamber in the inventive system with the operation of each individual chamber in Cox ‘773, but the present application focuses on the *relative timing* of carrying out operation steps in a pair of chambers. It is well known to operate a low-pressure processing chamber using the following cycle: (1) load, (2) pump down, (3) process, (4) vent, (5) unload. As such, it is unhelpful and largely irrelevant to observe the similarities or differences of the operation of *each chamber in*

isolation in the inventive system as compared to the operation of *each chamber in isolation* in a prior art system.

The Examiner errs again in attempting to justify his "routine experimentation" theory with the nonsensical statement that because Cox '773 is more time-efficient than the claimed system, "Cox necessarily *arrived* at his most efficient operation . . . by consideration of, or through experimental trial and error of, Applicant's own claimed control sequences." See Examiner's Answer at p. 11 (emphasis in original). In other words, the Examiner believes that Cox '773 renders the claims obvious because Cox must have tried the configuration recited in the pending claims and then progressed beyond that configuration in order to come up with its more time-efficient process.

The Examiner's position on routine experimentation is erroneous on several levels. First, routine experimentation with the Cox '773 system would not lead to the claimed invention because the overriding goal of Cox '773 is zero overhead. The closest to the inventive system that routine experimentation could take a skilled artisan beginning with Cox '773 is that the experimenter may discover downtime during the operation of Cox '773, as illustrated in the two drawings of the Cox embodiments shown in Exhibit A. However, even if the experimenter made this discovery, there is no apparent reason why he would then contradict the express goal of Cox '773 by adopting an operational sequence that leads to *less* efficiency, i.e., greater overhead. Second, the section of the Manual of Patent Examining Procedure on which the Examiner relies instructs examiners how to treat numerical claim ranges that overlap with ranges disclosed in the prior art, a situation that is not relevant to the present case. See Examiner's Answer at p. 11 (citing M.P.E.P. § 2144.05). Third, the Examiner's analysis turns the "routine experimentation" inquiry on its head. That inquiry asks whether the differences between the claimed conditions or ranges and the prior art were a matter of routine experimentation within the scope of ordinary skill in the art. See M.P.E.P. § 2144.05. The Examiner has inverted that analysis by instead asserting that a reference was arrived at through experimentation with the claimed system. Fourth, the Examiner's justification relies on faulty reasoning. From the fact that a reference is in some aspect more efficient than an inventive system, it does not follow that the reference must be an improvement on the claimed system that was achieved by beginning with the claimed system and then conducting experimentation.

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Finally, the Examiner asserts that Exhibit A, which summarizes certain characteristics of the cited references and the inventive system, indicates that Cox '773 already achieves a reduction in the number of pumps. *See Examiner's Answer* at pp. 11-12. The Examiner misunderstands Exhibit A. Even though the Examiner restates Appellant's point verbatim, he has ignored the fundamental point that, as clearly shown in the exhibit, Cox '773's single-pump embodiment does not conduct process pumping during *the entirety* of each chamber's processing phase.

In view of the numerous errors of law and logic inherent in the Examiner's reasoning, the Board should reverse the obviousness rejection.

D. Conclusion

The application under appeal represents a significant advance over the prior art that merits protection via the patent system. With this application, Appellant has taught a system that alleviates significant equipment expenses and achieves a simpler overall design for a dual chamber processing system in which both chambers share the same hardware resources. Specifically, the application provides a dual chamber vacuum processing system that eliminates the need for one of the vacuum pumps and two of the isolation valves, as compared to the prior art system that forms the basis for the Examiner's obviousness rejection.

Over the course of prosecution and appeal, Appellant has responded time and again to improper rejections from the Examiner. Finally, at this late stage and after Appellant has expended significant time and expense, the Examiner has reconsidered his position and through the Examiner's Answer withdrawn all but one of these rejections, leaving only the obviousness rejection for the Board's consideration. However, as explained above, the obviousness rejection is just as improper as the withdrawn rejections. The Examiner has not pointed to any references that, either alone or in combination, suggest the "computer configured to" limitation of Claim 12. Appellant respectfully submits that the Examiner's rejection is improper and that the pending claims are allowable over the art of record. As such, Appellant requests that the Board reverse the Examiner's rejection.

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IV. CLAIMS APPENDIX

Attached hereto as Claims Appendix is a copy of the finally rejected claims in the present case.

V. EVIDENCE APPENDIX

Attached hereto as Evidence Appendix is a copy of Exhibit A, originally submitted in the Amendment of August 11, 2006.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 1/28/08

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IV. CLAIMS APPENDIX

1-11. (Canceled)

12. A dual chamber processing system for continuously processing a plurality of workpieces comprising:

a common power source switchable between a first plasma applicator of a first chamber and a second plasma applicator of a second chamber,

the first chamber for processing a second workpiece in a vacuum to completion therein when the power source is applied thereto and switched ON,

a robot configured to remove at substantially atmospheric pressure a first workpiece from the second chamber after processing the first workpiece, the robot configured to reload the second chamber with a third workpiece to be processed while the second workpiece is being processed in the first chamber, the robot configured to remove at substantially atmospheric pressure the second workpiece from the first chamber after processing the first workpiece, the robot configured to reload the first chamber with a fourth workpiece to be processed while the third workpiece is being processed in the second chamber,

the second chamber for processing the third workpiece in a vacuum to completion therein when the power source is applied to the second plasma applicator and switched ON,

exactly one pump adapted to be in fluid communication with the first and second chambers, the pump being configured to perform both process pumping and pump-down pumping of both chambers; and

a computer configured to repeatedly synchronously and alternately control the power source application, the robot movement, the chamber processing, and the pump, the computer configured to control the pump and the robot to effect pump-down and subsequent process pumping of one of the chambers during simultaneous venting, workpiece removal and workpiece reloading of the other of the chambers, such that said pump-down pumping of one of the chambers and said venting of the other of the chambers begin at substantially the same time, and the computer being configured to open the pump to fluid communication with only one of the chambers at a time.

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13-17. (Canceled)

18. The system of Claim 12, wherein the single pump is a dry pump.

19. The system of Claim 12, wherein the system further comprises only one isolation valve between the pump and the first chamber.

20. The system of Claim 19, wherein the system further comprises only one isolation valve between the pump and the second chamber.

21. The system of Claim 12, wherein the first chamber and the second chamber are adjacent to each other.

22. The system of Claim 12, wherein the power source is a microwave power source.

23. The system of Claim 12, wherein the power source is a common radio frequency power source synchronously multiplexed between the two processing chambers.

24. The system of Claim 12, wherein the chambers are each configured to receive a single silicon wafer at a time, and the chambers are each downstream of a plasma reactor.

25. The system of Claim 12, wherein the chambers are each configured to receive a single silicon wafer at a time, and the chambers each comprise an in situ plasma reactor.

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V. EVIDENCE APPENDIX

(Originally submitted as Exhibit A in Amendment of August 11, 2006)

EXHIBIT A → FOR APPL. 10/624,728
 EXAMINER ZERVIGON, ART UNIT 1763

Fig. 16
 Cox (two pump)

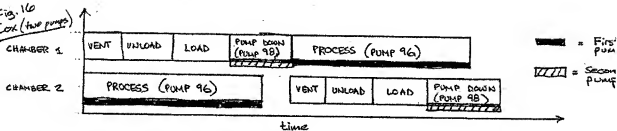
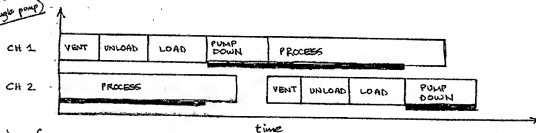


Fig. 15
 Cox (single pump)



Preferred unloading of Chambers

